

surface mount electronic components 338 integrated in a modular package with the Illumination assembly layers 302, it is not necessary that the display device 300 be mounted to a chassis and coupled to a separate printed circuit board as is required with the use of prior art EL display panels. Therefore, the EL display device 300 provides advantages over prior art EL panel

5 devices in terms of lower manufacturing costs, lighter weight, and smaller size.

Although the present invention has been particularly shown and described above with reference to three specific embodiments, it is anticipated that alterations and modifications thereof will no doubt become apparent to those skilled in the art. It is therefore intended that the following claims be interpreted as covering all such alterations

10 and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

CLAIMS

- 1 1. An integrated electroluminescent display device comprising:
2 at least one illumination assembly formed by a first set of layers, said illumination
3 assembly including a first electrode, a second electrode, a layer of electroluminescent material
4 disposed between said first and second electrodes, and a plurality of conductive leads connected
5 to corresponding ones of said first and second electrodes, said first electrode being translucent;
6 a printed circuit layer having a plurality of conductive segments connected to
7 corresponding ones of said first and second electrodes via said conductive leads; and
8 an electronic component layer including electronic components having electrical contacts
9 connected to corresponding ones of said segments of said printed circuit layer, said electronic
10 components providing for selective illumination of said illumination assembly;
11 wherein said printed circuit layer is disposed in a substantially parallel and contiguous
12 relationship with said first set of layers.
- 1 2. An integrated electroluminescent display device as recited in claim 1 further comprising a
2 protective coating forming an envelope surrounding said first set of layers, said printed circuit
3 layer, and electronic component layer.
- 1 3. An integrated electroluminescent display device as recited in claim 1 wherein said first
2 set of layers comprises:
3 a substrate formed of translucent material, and having said first electrode formed on a
4 surface thereof, said first electrode having a surface that is contiguous with said layer of
5 electroluminescent material; and
6 a first insulating layer formed by an electrically non-reactive material, said first insulating
7 layer for isolating said electroluminescent material from said second electrode.
- 1 4. An integrated electroluminescent display device as recited in claim 3 wherein said printed
2 circuit layer further comprises a second insulating layer providing for isolation of said
3 conductive segments from said second electrode, said conductive segments being formed on a
4 first surface of said second insulating layer.

1 5. An integrated electroluminescent display device as recited in claim 1 wherein said
2 electronic components comprise a battery providing power for illumination of said illumination
3 assembly.

1 6. An integrated electroluminescent display device as recited in claim 1 wherein said
2 electronic components comprise surface mount components.

1 7. An integrated electroluminescent display device as recited in claim 4 further comprising
2 at least one membrane switch including:
3 a first contact formed on said surface of said substrate; and
4 a second contact formed on a second surface of said second insulating layer which is
5 opposite said first surface, at least one of said first and second contacts being connected to a
6 corresponding one of said segments of said printed circuit layer, said first insulating layer
7 including a hole formed therethrough, said first and second contacts and said hole being aligned
8 so that said switch is activated upon said first contact being brought into contact with said second
9 contact, said electronic components being responsive to said activation of said switch.

1 8. An integrated electroluminescent display device as recited in claim 4 further comprising a
2 speaker formed on said substrate, said speaker being electrically coupled with said electronic
3 component layer via through holes formed through said first insulating layer and said second
4 insulating layer.

1 9. An integrated electroluminescent display device as recited in claim 1 wherein said
2 electroluminescent material comprises phosphor.

1 10. An integrated electroluminescent display device as recited in claim 1 wherein:
2 said first set of layers further includes a printed layer bearing a plurality of icons, each of
3 said icons being associated with one of a first set and a second set of icons, said illumination
4 assemblies forming a pattern corresponding to said second set of icons; and
5 said electronic components provides for selective illumination of said illumination
6 assemblies to create an illusion of movement of at least one of said first set of icons by
7 illuminating said second set of icons in accordance with a predetermined sequence.

1 11. An interactive book as recited in claim 1 wherein said first set of layers further comprises
2 at least one printable layer printed with characters, at least one of said illumination assemblies
3 being positioned to underlie a corresponding one of said characters.

1 12. An interactive book as recited in claim 11 wherein said electronic component layer
2 further comprises a sequencing circuit providing variable timing and ordering of said
3 illumination assemblies so that said characters appear to be animated.

1 13. A process for fabricating an integrated electroluminescent display device including at
2 least one illumination assembly coupled with electronic components for selectively illuminating
3 said assembly, said process comprising the steps of:

4 forming a translucent electrode layer including at least one translucent electrode over a
5 translucent substrate;

6 forming a layer of electroluminescent material over said translucent electrode layer;

7 forming a first insulating layer over said layer of electroluminescent material;

8 forming a base electrode layer including at least one base electrode over said first
9 insulating layer;

10 forming at least one via hole through said first insulating layer, said via hole allowing for
11 electrical coupling of corresponding ones of said translucent electrodes and base electrodes;

12 forming a second insulating layer over said base electrode layer, said second insulating
13 layer being contiguous with said base electrode layer;

14 forming a plurality of conductive segments on a first surface of said second insulating
15 layer;

16 forming a layer of electrical components over said second insulating layer, said electronic
17 components having electrical contacts connected to corresponding ones of said segments; and

18 forming at least one via hole through said second insulating layer, said via hole allowing
19 for electrical coupling between said electrical components and corresponding ones of said
20 translucent electrodes and base electrodes.

1 14. A process for fabricating an integrated electroluminescent display device as recited in
2 claim 13 further comprising the step of forming a protective envelope surrounding said first set

3 of layers, said printed circuit layer, and electronic component layer.

1 15. A process for fabricating an integrated electroluminescent display device as recited in
2 claim 13 further comprising the step of forming a flexible membrane switch by performing the
3 steps of:

4 forming a first contact on said substrate;

5 forming a second contact on a second surface of said second insulating layer, said second
6 surface being opposite said first surface, at least one of said first and second contacts being
7 connected to a corresponding one of said segments of said printed circuit layer; and

8 forming a hole through said first insulating layer, said first and second contacts and said
9 hole being aligned so that said switch is activated upon said first contact being brought into
10 contact with said second contact.